AMENDMENTS TO THE CLAIMS

The listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

1. (Currently Amended) A three-dimensional measurement method for measuring a distance to a plurality of positions on an object by projecting light and receiving light reflected from the object, said three-dimensional measurement method comprising the steps of:

projecting a light on ~~an~~ the object;

receiving light reflected from the object by an area sensor comprising a plurality of photoelectric conversion elements;

controlling the active/inactive timing of the area sensor such that an electric charge photoelectrically converted by the plurality of photoelectric conversion elements is accumulated with a timing synchronously with the ~~photoelectric conversion elements are exposed to light reflected from the object and a sensitivity of the area sensor is varied, synchronously with a modulation period of~~ light projection ~~which are periodically modulated in a frame~~; and

measuring the distance to each photoelectric conversion element based on the output of the area sensor,

wherein changing said active/inactive states of the area sensor is performed a plurality of times in one accumulating period of the area sensor.

2. (Currently Amended) The three-dimensional measurement method according to claim 1, wherein

the distance to said each photoelectric conversion element is measured based on the output of the area sensor when the active/inactive timing of the area sensor is controlled such that the amount of exposure of the area sensor is dependent on the light propagation time, and

the output of the area sensor when the active/inactive timing of the area sensor is controlled such that the amount of exposure of the area sensor is independent of the light propagation time.

3. (Currently Amended) The three-dimensional measurement method according to claim 1, wherein the period of the projected pulse light matches the period of the exposure of ~~the~~ a respective photoelectric conversion element.

4. (Previously Presented) The three-dimensional measurement method according to claim 1, wherein a plurality of exposures are obtained by different timings in a single projection.

5. (Previously Presented) The three-dimensional measurement method according to claim 1, wherein a plurality of the exposures are obtained within a period of pulse light projection.

6. (Currently Amended) A three-dimensional measurement device for measuring the distance to a plurality of positions on an object by projecting light and receiving the light reflected from the object, said three-dimensional measurement device comprising:

a projector for projecting pulse light on ~~an~~ the object;

an area sensor comprising a plurality of photoelectric conversion elements for receiving light reflected from the object;

a controller for controlling ~~the~~ ON/OFF states of the plurality of photoelectric conversion elements with a timing synchronized with the pulse light projection to obtain at least two frame images, the ON/OFF states are activated a plurality of times in one accumulating period of the area sensor; and

a processor for eliminating the fluctuating component of the received light intensity due to distance or reflectivity of the object from the amount of exposure obtained based on the control of the ON/OFF ~~control~~ states by use of the at least two frame images.

7. (Currently Amended) The three-dimensional measurement device according to claim 6, further comprising an internal optical path for directing the pulse light from the projector to at least one photoelectric conversion element in the ~~solid-state~~ area sensor, wherein

the measurement value is corrected in accordance with the amount of exposure of the area sensor by the pulse light propagated through the internal optical path.

8. (Currently Amended) The three-dimensional measurement device according to claim 6, further comprising an optical unit capable of switching the luminance distribution within the range projected by the projector so as to sequentially project light of a first luminance distribution and light of a second luminance distribution on ~~an~~ the object, wherein

the three-dimensional device is provided an operation mode for measuring the distance to each photoelectric conversion element based on the output of the ~~solid-state~~ area sensor in a first projection and the output of the ~~solid-state~~ area sensor in a second projection.

9. (Currently Amended) The three-dimensional measurement device according to claim 6, wherein control of the ON/OFF ~~control~~ of the plurality of photoelectric conversion elements is accomplished differently for each line of the area sensor.

10. (Currently Amended) ~~A~~ The three-dimensional measurement method ~~for measuring a distance to a plurality of positions on an object by projecting light and receiving light reflected from the object, said three-dimensional measurement method comprising the steps of:~~ according to claim 23, wherein

the step of projecting the light on the object includes sequentially projecting light of a first luminance distribution which is uneven distribution on ~~an~~ the object and light of a second luminance distribution which is uneven distribution being different from the first luminance distribution on ~~an~~ the object;

the step of receiving light reflected by the object includes receiving light reflected by the object in each projection cycle by ~~a solid state~~ the area sensor comprising ~~a~~ the plurality of photoelectric conversion elements; and

the step of measuring the distance to each photoelectric conversion element includes measuring the distance to each photoelectric conversion element based on the output of the ~~solid state~~ area sensor in a first projection and the output of the ~~solid state~~ area sensor in a second projection.

Claims 11 - 20 (Cancelled)

21. (Currently Amended) The three-dimensional measuring apparatus according to claim 6, wherein the controller controls the ON/OFF ~~state~~ states in a different manner in different frames.

22. (Currently Amended) A three-dimensional measurement method for measuring a distance to a plurality of positions on an object by projecting light and receiving light reflected from the object, said three-dimensional measurement method comprising the steps of:

projecting a light on ~~an~~ the object with a projector;

receiving light reflected from the object by an area sensor comprising a plurality of photoelectric conversion elements;

controlling the projector to emit light a plurality of times periodically during one ~~frame~~ accumulating period of the area sensor and periodic ON/OFF states of the plurality of photoelectric conversion elements ~~periodically~~ a plurality of times during one ~~frame~~ accumulating period synchronously with the periodical emitting of the projector; and

measuring the distance to each photoelectric conversion element based on the output of the area sensor.

23. (New) A three-dimensional measurement method for measuring a distance to a plurality of positions on an object by projecting light and receiving light reflected from the object, said three-dimensional measurement method comprising the steps of:

projecting a light on the object with a projector;

receiving light reflected from the object by an area sensor comprising a plurality of photoelectric conversion elements;

controlling the projector to emit light and ON/OFF states of the plurality of photoelectric conversion elements synchronously with the emitting of the projector; and

measuring the distance to each photoelectric conversion element based on the output of the area sensor, wherein

said area sensor includes two gates in said each photoelectric conversion element for controlling an electric charge photoelectrically converted by said each photoelectric conversion element, the ON/OFF states of said two gates are activated alternately.

24. (New) The three-dimensional measurement method according to claim 23 wherein

one of said two gates accumulates an electric charge photoelectrically converted by said each photoelectric conversion element, and the other gate discharges the electric charge photoelectrically converted by said each photoelectric conversion element.

25. (New) A three-dimensional measurement method according to claim 23, wherein

the ON/OFF states of said two gates are controlled a plurality of times during one accumulating period of the area sensor.

26. (New) A three-dimensional measurement device for measuring the distance to a plurality of positions on an object by projecting light and receiving the light reflected from the object, said three-dimensional measurement device comprising:

a projector for projecting light on the object;

an area sensor comprising a plurality of photoelectric conversion elements for receiving light reflected from the object;

a controller for controlling ON/OFF states of the plurality of photoelectric conversion elements with a timing synchronized with the light projection; and

a processor for eliminating the fluctuating component of the received light intensity due to distance or reflectivity of the object from the amount of exposure obtained based on the controlling of the ON/OFF states of the plurality of photoelectric conversion elements, wherein

said area sensor including two gates in each photoelectric conversion element for controlling an electric charge photoelectrically converted by said each photoelectric conversion element, the ON/OFF states of said two gates activate alternately.

27. (New) A three-dimensional measurement method according to claim 26, wherein

one of said two gates accumulates an electric charge photoelectrically converted by a respective photoelectric conversion element, and the other gate discharges the electric charge photoelectrically converted by the respective photoelectric conversion element.

28. (New) A three-dimensional measurement method according to claim 26, wherein

the ON/OFF states of said two gates are controlled a plurality of times during one accumulating period of the area sensor.

29. (New) An area sensor for measuring the distance to a plurality of positions on an object by receiving the light reflected from the object, said area sensor comprising:

a plurality of pixels for receiving incident light, said pixel including:

photoelectric conversion elements for converting the incident light to electric charge photoelectrically;

a first gate for controlling the electric charge to accumulate for output; and

a second gate for controlling the electric charge to discharge, wherein

ON/OFF states of said first and second gate are controlled alternately.

30. (New) An area sensor according to claim 29, wherein

the ON/OFF states of said first and second gates are controlled a plurality of times during one accumulating period of the area sensor.

31. (New) An area sensor according to claim 29, wherein

when a projector emits light on the object, the ON/OFF states of said first and second gates are controlled synchronously with the emitting of the projector.